

Claims

1 1. A Gram-positive bacterium which has been transformed with heterologous
2 genes encoding alcohol dehydrogenase and pyruvate decarboxylase wherein said
3 genes are expressed at sufficient levels to confer upon said Gram-positive bacterium
4 transformant the ability to produce ethanol as a fermentation product.

1 2. The Gram-positive bacterium, according to claim 1, wherein said host is
2 selected from the group consisting of *Bacillus*, *Lactobacillus*, *Streptococcus*, *Fibribacter*,
3 *Ruminococcus*, *Pediococcus*, *Cytophaga*, *Cellulomonas*, *Bacteroides*, and *Clostridium*.

1 3. The Gram-positive bacterium according to claim 2, wherein said host is a
2 *Bacillus* sp.

1 4. The Gram-positive bacterium, according to claim 3, wherein said *Bacillus*
2 sp. is selected from the group consisting of *B. subtilis* and *B. polymyxa*.

1 5. The Gram-positive bacterium, according to claim 1, which has been
2 transformed with *Z. mobilis* genes encoding alcohol dehydrogenase and pyruvate
3 decarboxylase.

1 6. The Gram-positive bacterium according to claim 1, wherein said bacterium
2 is further transformed with a gene encoding an enzyme which degrades
3 oligosaccharides.

1 7. The Gram-positive bacterium, according to claim 6, wherein said enzyme
2 which degrades oligosaccharides is a polysaccharase.

1 8. The Gram-positive bacterium according to claim 7, wherein said
2 polysaccharase is selected from the group consisting of cellulolytic, xylanolytic, and
3 starch-degrading enzymes.

1 9. The Gram-positive bacterium, according to claim 1, wherein said
2 heterologous genes are incorporated onto the chromosome of said bacterium.

1 10. A method for the production of ethanol, said method comprising
2 transforming a Gram-positive bacterial host with heterologous genes encoding
3 pyruvate decarboxylase and alcohol dehydrogenase wherein said genes are expressed
4 at sufficient levels to result in the production of ethanol as a fermentation product.

1 11. The method, according to claim 10, wherein said host is selected from the
2 group consisting of *Bacillus*, *Lactobacillus*, *Streptococcus*, *Fibribacter*, *Ruminococcus*,
3 *Pediococcus*, *Cytophaga*, *Cellulomonas*, *Bacteroides*, and *Clostridium*.

1 12. The method, according to claim 11, wherein said host is a *Bacillus* sp.

1 13. The method, according to claim 12, wherein said *Bacillus* sp. is selected
2 from the group consisting of *B. subtilis* and *B. polymyxa*.

1 14. The method, according to claim 10, wherein said Gram-positive bacterium
2 has been transformed with *Z. mobilis* genes encoding alcohol dehydrogenase and
3 pyruvate decarboxylase.

1 15. The method, according to claim 10, wherein said bacterium is further
2 transformed with a gene encoding an enzyme which degrades oligosaccharides.

1 16. The method, according to claim 15, wherein said enzyme which degrades
2 oligosaccharides is a polysaccharase.

1 17. A method for reducing the accumulation of acidic metabolic products in
2 the growth medium of Gram-positive bacteria, said method comprising transforming
3 said bacteria with heterologous genes which express alcohol dehydrogenase and
4 pyruvate decarboxylase at sufficient levels to result in the production of ethanol as
5 a fermentation product.

1 18. A plasmid designated pLOI1500.